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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/524,669	02/11/2005	Volker Hennige	265287US0X PCT	1522
22850 7590 11/27/2009 OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, L.L.P. 1940 DUKE STREET ALEXANDRIA, VA 22314				
EXAMINER CREPEAU, JONATHAN				
ART UNIT 1795		PAPER NUMBER		
NOTIFICATION DATE 11/27/2009		DELIVERY MODE ELECTRONIC		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary

Application No.

10/524,669

Applicant(s)

HENNIGE ET AL.

Examiner

Jonathan Crepeau

Art Unit

1795

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 November 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 and 22-26 is/are pending in the application.
- 4a) Of the above claim(s) 13-20 and 22-25 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12 and 26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB06)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on November 4, 2009 has been entered.

This Office action addresses claims 1-20 and 22-26. Claims 13-20 and 22-25 remain withdrawn from consideration. Although claims 1 and 26 have been amended, claims 1-12 and 26 remain rejected for the reasons of record. This action is non-final.

Claim Rejections - 35 USC § 103

2. Claims 1-12 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Penth et al (U.S. Patent 6,309,545) in view of Ashida et al (U.S. Patent 6,200,706).

Penth et al. is directed to a composite material that may be used as a battery separator (see col. 9, line 50). The separator may comprise a felt (i.e., nonwoven fibrous fabric) made of a polymer material (see col. 3, lines 50 and 55), which is a "sheetlike flexible substrate having a multiplicity of openings" as recited in claim 1. The separator further comprises an inorganic particulate coating comprising an oxide adhered via a metal oxide layer such as silica or zirconia (see col. 5, line 49; col. 6, line 4). The particles may have a size in the range of 1-10,000 nm (see col. 6, line 23) and may comprise an oxide of Al, Zr, or Si. In Example 1.6, a specific

formulation of particulate zirconia (50 nm size) is added to a sol of zirconium tetraisopropylate, which would result in the particulate zirconia adhered to the substrate via a layer of zirconia. The separator has a thickness of 5-1000 microns (see col. 6, line 60). Regarding claims 1 and 26, the coating is prepared from a sol or suspension having an alcohol (i.e., ethanol) as a solvent (see col. 5, line 11; Examples 1.3, 1.4, 1.8). Regarding claims 1 and 26, which recite a solvent mixture of a hydrocarbon and an alcohol, and that the hydrocarbon is cyclohexane, although Penth et al. do not appear to teach that the solvent used in the process comprises a hydrocarbon (i.e., cyclohexane), the patentability of a product does not depend on its method of production. If the product in a product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process. *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). Furthermore, once the examiner provides a rationale tending to show that the claimed product appears to be the same or similar to that of the prior art, although produced by a different process, the burden shifts to applicant to come forward with evidence establishing an unobvious difference between the claimed product and the prior art product. *In re Marosi*, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983); MPEP §2113.

The reference does not expressly teach that the basis weight of the separator/nonwoven is less than 50 g/m², as recited in claim 1, or less than 20 g/m², as recited in claims 2 and 7.

The Ashida et al. reference is directed to a nonwoven fabric for a battery separator. In column 9, line 31, it is disclosed that the basis weight of the separator is 5-100 g/m², preferably 10-50 g/m².

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated to manufacture the separator of Penth et al. with a basis weight of 10-50 g/m², since this range is disclosed by Ashida et al. as being preferred. Further, Ashida et al. identify the basis weight as a result effective variable that may be used to affect void content (porosity) of the separator (col. 13, lines 30-34). It has been held that the discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art. *In re Boesch*, 205 USPQ 215 (CCPA 1980).

Regarding claim 3, the disclosure of "plastic" in Penth et al. would render obvious at least the claimed species of polyester and polyolefin, which would be readily envisioned by a skilled artisan. Further, Ashida et al. disclose polyolefin fibers at col. 7, line 20.

Regarding claim 4, which recites that the fibers are from 0.1-10 microns in diameter, Ashida et al. teach that the fibers have a diameter of 1 micron or less to prevent formation of pin holes (col. 7, lines 36-42). Accordingly, the artisan would be motivated to employ this fiber size in the nonwoven separator of Penth et al.

Regarding claim 5, which recites that the flexible substrate has a porosity of 50-97% and claim 9, which recites that the separator has a porosity of 30-80%, these ranges are also rendered obvious by Penth et al. The reference contains passages discussing particle sizes capable of permeating through the separator (col. 3, line 35), pore size/pore distribution (col. 3, line 8), and a carrier having materials of different porosity (col. 8, line 35). Accordingly, it would be obvious to optimize the porosity of the separator of Penth et al. to affect the pore size, pore

distribution, and separator permeation characteristics, thereby rendering the claimed ranges obvious.

Regarding claim 6, the claimed thickness range of less than 30 microns is obvious in light of the teaching of Penth et al. of a thickness of 5-1000 microns.

Regarding claims 10-12, which recite ranges of breaking strength and bendable radius, it is submitted that the separator of Penth et al. as modified by Ashida et al. would possess these properties. In the alternative, it would be obvious to manufacture a separator with a high breaking strength and a high flexibility as measured by a bendable radius characteristic.

Double Patenting

3. Claims 1-12 and 26 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-12 and 25 of copending Application No. 10/524143 in view of Penth et al. The '143 application claims do not recite the adhering layer of silica or zirconia, as recited in claim 1, or the particle size of the oxide particles as also recited in claim 1.

As noted above, Penth et al. teach a separator comprising a substrate coated with a silicon or zirconium oxide derived from a sol and a particulate metal oxide having a nanoscale particle size.

It would have been obvious to use the particle size and oxide attaching layer of Penth et al. in the separator of the '143 claims. In column 2, line 8 and column 3, line 6, Penth et al. teach that the composite can be produced simply and economically and allows the pore size and/or

pore distribution of the composite to be easily adjusted for special applications. Accordingly, the instant claims are obvious variants of the '143 application claims.

This is a provisional obviousness-type double patenting rejection.

4. Claims 1-12 and 26 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 3, 4, 7-10, 32-38, 40, and 46-58 of copending Application No. 10/501713 in view of Penth et al. and Ashida et al.

The '713 application claims recite a metal oxide coating, but do not recite the adhering layer of silica or zirconia in combination with nanoscale particles as recited in claim 1, or the separator basis weight as also recited in claim 1.

As noted above, Penth et al. teach a separator comprising a substrate coated with a silicon or zirconium oxide derived from a sol and a particulate metal oxide having a nanoscale particle size.

It would have been obvious to use the particle size and oxide attaching layer of Penth et al. in the separator of the '713 claims. In column 2, line 8 and column 3, line 6, Penth et al. teach that the composite can be produced simply and economically and allows the pore size and/or pore distribution of the composite to be easily adjusted for special applications.

As also noted above, Ashida et al. teach a separator basis weight of preferably 10-50 g/m². It would have been obvious to employ the basis weight of Ashida et al. in the separator defined by the '713 application claims for the reasons stated above. Accordingly, the instant claims are obvious variants of the '713 application claims.

This is a provisional obviousness-type double patenting rejection.

5. Claims 1-12 and 26 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-12 and 31-39 of copending Application No. 10/504144 in view of Penth et al. and Ashida et al.

The '144 application claims recite a metal oxide coating, but do not recite the adhering layer of silica or zirconia in combination with nanoscale particles as recited in claim 1, or the separator basis weight as also recited in claim 1.

As noted above, Penth et al. teach a separator comprising a substrate coated with a silicon or zirconium oxide derived from a sol and a particulate metal oxide having a nanoscale particle size.

It would have been obvious to use the particle size and oxide attaching layer of Penth et al. in the separator of the '144 claims. In column 2, line 8 and column 3, line 6, Penth et al. teach that the composite can be produced simply and economically and allows the pore size and/or pore distribution of the composite to be easily adjusted for special applications.

As also noted above, Ashida et al. teach a separator basis weight of preferably 10-50 g/m². It would have been obvious to employ the basis weight of Ashida et al. in the separator defined by the '144 application claims for the reasons stated above. Accordingly, the instant claims are obvious variants of the '144 application claims.

This is a provisional obviousness-type double patenting rejection.

Response to Arguments

6. Applicant's arguments filed November 4, 2009 have been fully considered but they are not persuasive. In particular, the amendment to claim 1 reciting a mixture of at least one alcohol and at least one hydrocarbon is still not considered to distinguish over the Penth et al. reference. Initially, it is noted that the Examiner's comments from the previous Office action remain applicable herein. Specifically, instant claim 1 recites an "alcohol" and a "hydrocarbon," while Inventive Example 3 uses isopropanol and cyclohexane. Thus, it is submitted that claim 1 is still not commensurate in scope with the alleged unexpected results. There do not appear to be other inventive examples that use additional alcohols or hydrocarbons that would support a finding that a mixture of any alcohol and any hydrocarbon would produce the beneficial results of the invention.

Applicants further state that "Figs. 3 to 5 herein, and Table 2, demonstrate the influence of solvent on various properties of the resulting ceramic coating, the only difference being the solvent. [...] The production of ceramic layers using polar [sic] solvents and especially of cyclohexane or cyclohexane-containing mixture is therefore particularly preferable." In response, the cited Figures and Tables have been reviewed but are also not considered to support a finding that the method of claim 1 produces a patentably distinct product from Penth et al. While it is acknowledged that Figs. 3-5 do show different properties for the different solvents, the solid materials used in these examples appear to be only ceramics, which is not considered to be conclusive evidence of the reproducibility of these results using the ceramics as coatings on polymeric fibrous substrates. Stated another way, the data shown in Figures 3-5 do not result

from the coating of the ceramic on a fibrous substrate, as recited in the instant claims, and it is not apparent if these results necessarily correspond to ceramic coatings on fibrous nonwoven substrates in a way that would distinguish over Penth et al.

Furthermore, as stated in the previous Office action, there are several differences between Inventive Example 3 and Comparative Examples 1 and 2 that do not clearly show the source of the battery capacity improvement. As stated above, Inventive Example 3 employs isopropanol and cyclohexane, in addition to LEVASIL® and AEROSIL®. Comparative Examples 1 and 2 employ ethanol, aqueous HCl, tetraethoxysilane, methyltriethoxysilane, Martoxid MZS-1 and Martixod MZS-3. These coating compositions are significantly different, and the alleged improvement being due to the different solvents cannot be verified. In addition, it is noted that the nonwoven fabrics are different in starting thickness and starting basis weight, and the final separator products are also different in thickness and basis weight. Accordingly, it is submitted that due to the significant variations in materials, basis weight, and thickness between the cited examples, Applicant's argument that the selection of particular solvents produces an unexpected result cannot be substantiated.

Applicants further state that Penth et al. is "significantly broader" than the present invention and that "one of ordinary skill in the art would not appreciate from Penth et al. the particular problems which arise from the use of a substrate material made of electrically nonconductive fibers." In response, it is noted that Penth et al. teach that preferable carriers are made of a "fiber" and are preferably metal or plastic (col. 5, line 45). Thus, it is believed that Penth et al. teach the claimed substrate material with sufficient specificity. Further, it is

submitted that it is not necessary for the Penth et al. reference to be concerned with the particular problems of a polymeric fiber substrate in order to be applicable to the instant claims.

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan Crepeau whose telephone number is (571) 272-1299. The examiner can normally be reached Monday-Friday from 9:30 AM - 6:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Basia Ridley, can be reached at (571) 272-1453. The phone number for the organization where this application or proceeding is assigned is (571) 272-1700. Documents may be faxed to the central fax server at (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).